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1 (currently amended). A method for functionalizing a collection of carbon nanotubes (CNTs), the method comprising:

irradiating a precursor gas at a selected production location to provide a plurality of particles of [a] at least one selected target species in a first chamber having a first selected chamber pressure p_1 , where at least one non-target species is also present in the first chamber;

providing a collection of CNTs on a substrate in a second chamber having a second selected sub-Torr pressure p_2 , where p_2 lies in a range of about $0.002p_1 - 0.01p_1$;

providing a particle communication mechanism, having a particle aperture entrance, that allows transport of at least a portion of the particles from the first chamber to the second chamber, wherein transport of ultraviolet radiation is suppressed by providing at least one of the following: (i) the aperture central axis is aligned off-axis so that substantially no ultraviolet radiation that is produced within the first chamber can move in a single straight line from the first chamber to the second chamber, (ii) the aperture central axis is curvilinear, and is provided with sufficient curvature so that substantially no ultraviolet radiation that is produced within the first chamber can move in a single straight line from the first chamber to the second chamber, and (iii) the aperture central axis has at least one bend point at which a direction of the central axis changes abruptly so that substantially no ultraviolet radiation that is produced within the first chamber can move in a single straight line from the first chamber to the second chamber, where the aperture entrance is spaced apart by a selected distance from the production location, and the selected distance is approximately equal to a distance value (i) that is no greater than a product of a representative particle velocity and an estimated lifetime for [a] the at least one selected target species particle and (ii) that is much greater than a product of a representative particle velocity and an estimated lifetime for at least one non-target species particle; and

allowing at least one of the selected target species particles to become chemically attached to at least one of the CNTs in the second chamber,

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whereby a density of the at least one non-target species adjacent to the aperture entrance is reduced relative to a density of the at least one selected target species adjacent to the aperture entrance.

2-3 (canceled).

4 (previously amended). The method of claim 1, further comprising providing at least a portion of said aperture side wall with a chemical substance (i) that absorbs said ultraviolet radiation and emits no radiation in response thereto or (ii) that absorbs said ultraviolet radiation and, in response thereto, emits radiation having an emitted energy that is lower than required to cause a bond breakage in at least one of a carbon-carbon bond and a carbon-hydrogen bond.

5 (original). The method of claim 1, further comprising choosing the target particles from a group of target particle species consisting of H, Li, Na, K, Rb, Cs, F, Cl, Br, I, dichlorocarbene, C_nH_{2n} , C_nH_{2n+1} and C_nH_{2n+2} , with $n = 1, 2$ and 3 .

6 (original). The method of claim 1, wherein said step of irradiating said precursor gas comprises irradiating said precursor gas with at least one of a dc source, a radiofrequency source, a microwave source and an induction source of radiation to provide a cold plasma.

7 (original). The method of claim 1, further comprising choosing said pressure p_1 in a range $100 \mu\text{m Hg} \leq p_1 \leq 1000 \mu\text{m Hg}$.

8 (original). The method of claim 1, further comprising choosing said pressure p_2 in a range $1 \mu\text{m Hg} \leq p_2 \leq 10 \mu\text{m Hg}$.

9 (currently amended). The method of claim 1, further comprising allowing at least one particle of said selected target ~~particles~~ species to become chemically

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attached to at least one of said CNTs in said second chamber in an exposure time interval no longer than about 30 sec.

10 (currently amended). The method of claim 1, further comprising allowing said at least one particle of said selected target ~~particle species~~ to become chemically attached to said at least one CNT at a temperature in said second chamber that is no greater than about room temperature.

11-20 (canceled).

21 (currently amended). A method for functionalizing a collection of carbon nanotubes (CNTs), the method comprising:

irradiating a precursor gas at a selected production location to provide a plurality of particles of a selected charged particle target species in a first chamber having a first selected chamber pressure p_1 , and to provide a preferred initial velocity for at least one particle of the selected charged particle target species ~~particle~~, where at least one charged non-target species particle is also present in the first chamber;

providing a collection of CNTs on a substrate in a second chamber having a second selected sub-Torr pressure p_2 , where p_2 lies in a range of about $0.002p_1 - 0.01p_1$;

providing a particle communication mechanism, having a particle aperture entrance that is spaced apart from the production location by a selected distance, that allows transport of at least a portion of the particles from the first chamber to the second chamber;

configuring said particle communication mechanism so that transport of ultraviolet radiation from said first chamber to said second chamber is suppressed;

providing a substantially constant magnetic field **B** in the first chamber, where the magnitude and direction of the magnetic field **B** are chosen so that (i) a trajectory in the field **B** of at least one particle of the selected charged particle

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target species ~~particle~~ produced at the production location will pass substantially through the aperture entrance and (ii) a trajectory in the field **B** for at least one charged non-target species particle produced at the production location will be no closer than a positive threshold distance from the aperture entrance,

whereby at least one particle of the selected charged particle target species ~~particles~~ becomes chemically attached to at least one of the CNTs in the second chamber, and a density of the at least one non-target species adjacent to the aperture entrance is reduced relative to a density of the selected charged particle target species adjacent to the aperture entrance.

22 (currently amended). The method of claim 21, further comprising:

at a first selected time, providing a first vector value **B1** of said magnetic field **B** for which said corresponding trajectory in the magnetic field **B1** of [a] said first selected charged particle target species is preferentially delivered to said particle aperture entrance; and

at a second selected time that is later than the first selected time, providing a second vector value **B2** of said magnetic field **B** for which said corresponding trajectory in the magnetic field **B2** of a second selected charged particle target species is preferentially delivered to said particle aperture entrance, where the magnitude of the field **B1** differs from the magnitude of the field **B2**.

23 (canceled).

24 (previously amended). The method of claim 21, wherein said transport of said ultraviolet radiation from said first chamber to said second chamber is suppressed by providing an elongated aperture, having an aperture central axis and an aperture side wall and connecting said first and second chambers, further comprising arranging the aperture according to at least one of the following: (i) the aperture central axis is aligned off-axis so that little or no ultraviolet radiation that is produced within said first chamber can move in a single straight line from said

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first chamber to said second chamber, (ii) the aperture central axis is curvilinear, and is provided with sufficient curvature so that substantially no ultraviolet radiation that is produced within said first chamber can move in a single straight line from said first chamber to said second chamber, and (iii) the aperture central axis has at least one bend point at which a direction of the central axis changes abruptly so that substantially no ultraviolet radiation that is produced within said first chamber can move in a single straight line from said first chamber to said second chamber.

25 (original). The method of claim 24, further comprising providing at least a portion of said aperture side wall with a chemical substance (i) that absorbs said ultraviolet radiation and emits no radiation in response thereto or (ii) that absorbs said ultraviolet radiation and, in response thereto, emits radiation having an emitted energy that is lower than required to cause a bond breakage in at least one of a carbon-carbon bond and a carbon-hydrogen bond.

26 (original). The method of claim 21, further comprising choosing ~~the said~~ selected charged particle target species particles from a group of target particle species having a non-zero electrical charge and consisting of H, Li, Na, K, Rb, Cs, F, Cl, Br, I, dichlorocarbene, C_nH_{2n} , C_nH_{2n+1} and C_nH_{2n+2} , with $n = 1, 2$ and 3 .

27 (original). The method of claim 21, wherein said step of irradiating said precursor gas comprises irradiating said precursor gas with at least one of a dc source, a radiofrequency source, a microwave source and an induction source of radiation to provide a cold plasma.

28 (original). The method of claim 21, further comprising choosing said pressure p_1 in a range $100 \mu\text{m Hg} \leq p_1 \leq 1000 \mu\text{m Hg}$.

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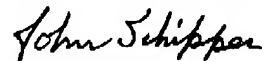
29 (original). The method of claim 21, further comprising choosing said pressure p_2 in a range $1 \mu\text{m Hg} \leq p_2 \leq 10 \mu\text{m Hg}$.

30 (currently amended). The method of claim 21, further comprising allowing at least one particle of said selected charged particle target species ~~particles~~ to become chemically attached to at least one of said CNTs in said second chamber in an exposure time interval no longer than about 30 sec.

31 (currently amended). The method of claim 21, further comprising allowing at least one particle of said ~~at least one~~ selected charged particle target species ~~particle~~ to become chemically attached to said at least one CNT at a temperature in said second chamber that is no greater than about room temperature.

32-42 (canceled).

Respectfully Submitted



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